

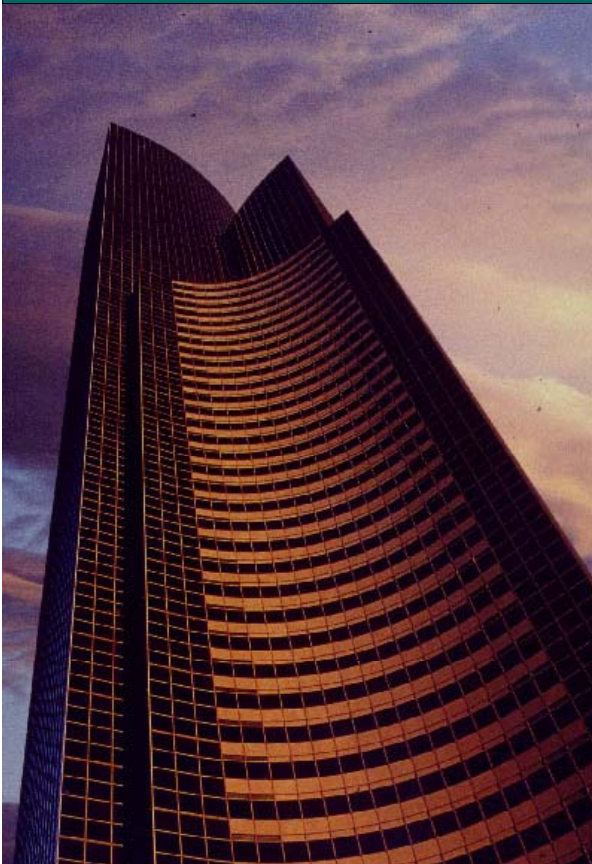
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building performance

Project Update: Estabrook School

November 04, 2010



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Agenda

- Update on source characterization
 - Directive given at the October 12, 2010 meeting of the Superintendent's Advisory Committee
 - October 18-19, 2010 air sampling
 - Discussed at October 28, 2010 meeting of the School Committee
- Describe additional interim measures
- Review initial operation and maintenance (O&M) plan



Indoor Air Sample Results

Round 7, Occupied Areas

Table 2 Air Sample Results for Polychlorinated Biphenyls as Total Homologs, Estabrook Elementary School, 117 Grove Street, Lexington, Massachusetts, July 22, 2010 – October 19, 2010*

Sample Location	PCBs in Air as Total Homologs (ng/m ³)						
	Round 1 ^a	Round 2 ^b	Round 3 ^c	Round 4 ^d	Round 5 ^e	Round 6 ^f	Round 7 ^g
Room 1	299	426	118 [‡]	63 [‡]	76 [‡]	153 [‡]	145
Room 2	–	775	455	189	166	253 [†]	53
Room 3	–	–	–	–	–	364 [†]	111
Room 4	–	–	–	–	–	344 [†]	126
Room 5	459	736	320	196	149	209 [†]	67 - 90
Room 6	1,800	764	483	171	213	383	182

[†] Samples collected with reduced outdoor air delivery.

[‡] Sample collected with supplemental air outdoor air (1200 CFM).



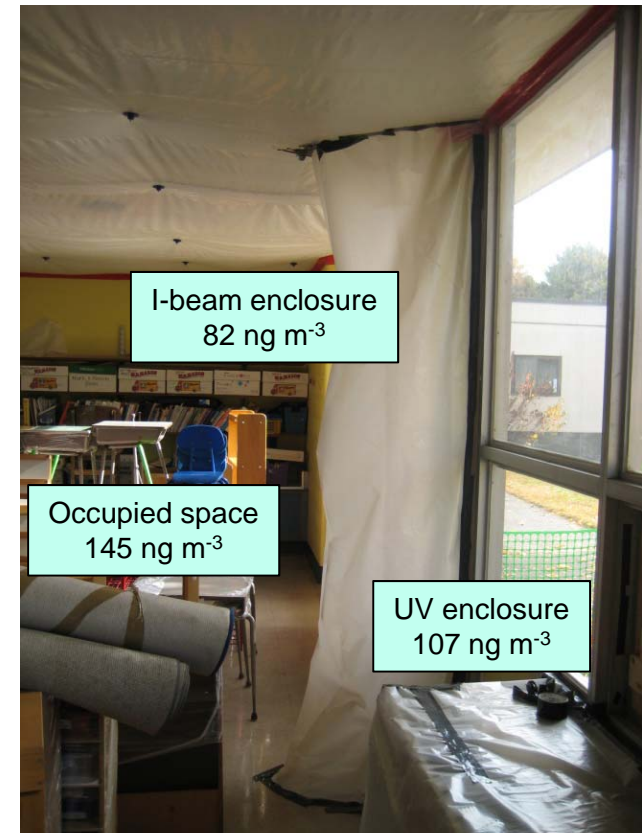
Source Characterization

Summary of Findings

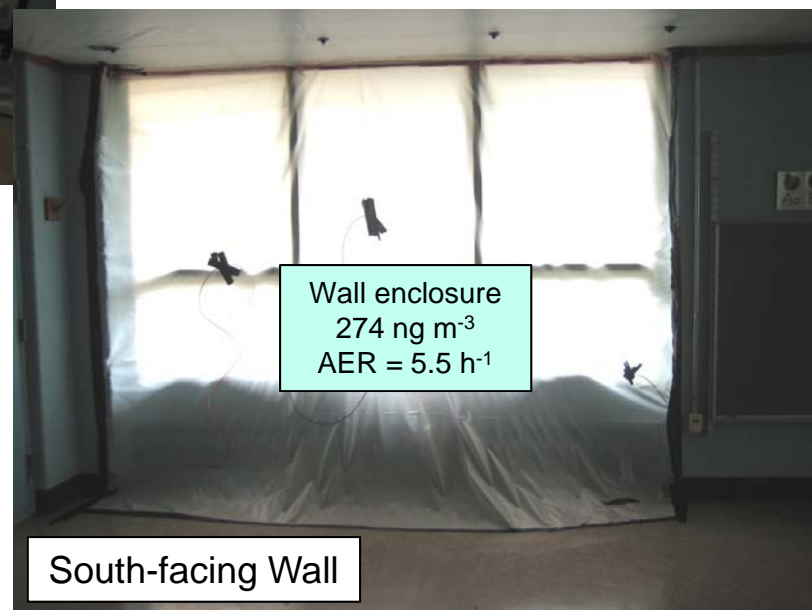
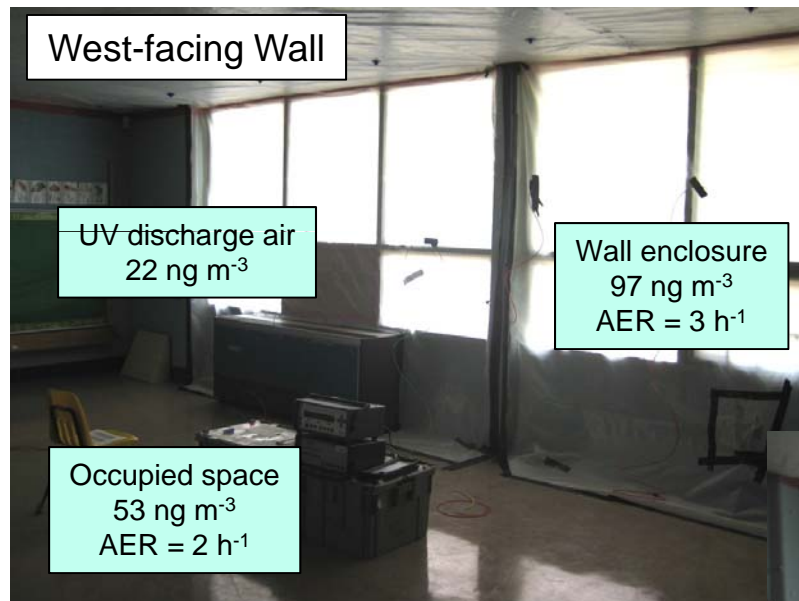
- PCB levels in enclosures containing the curtain wall were higher than in the classroom
- PCB levels were highest in the enclosure that contained an operating steam radiator
- PCB levels in unit ventilators and in unit ventilator discharge air were approximately equal to or less than levels in air of the classrooms
- PCB levels in rooms with portable air cleaners were lower than in other rooms, with one exception (Room 2 with full curtain wall enclosures)



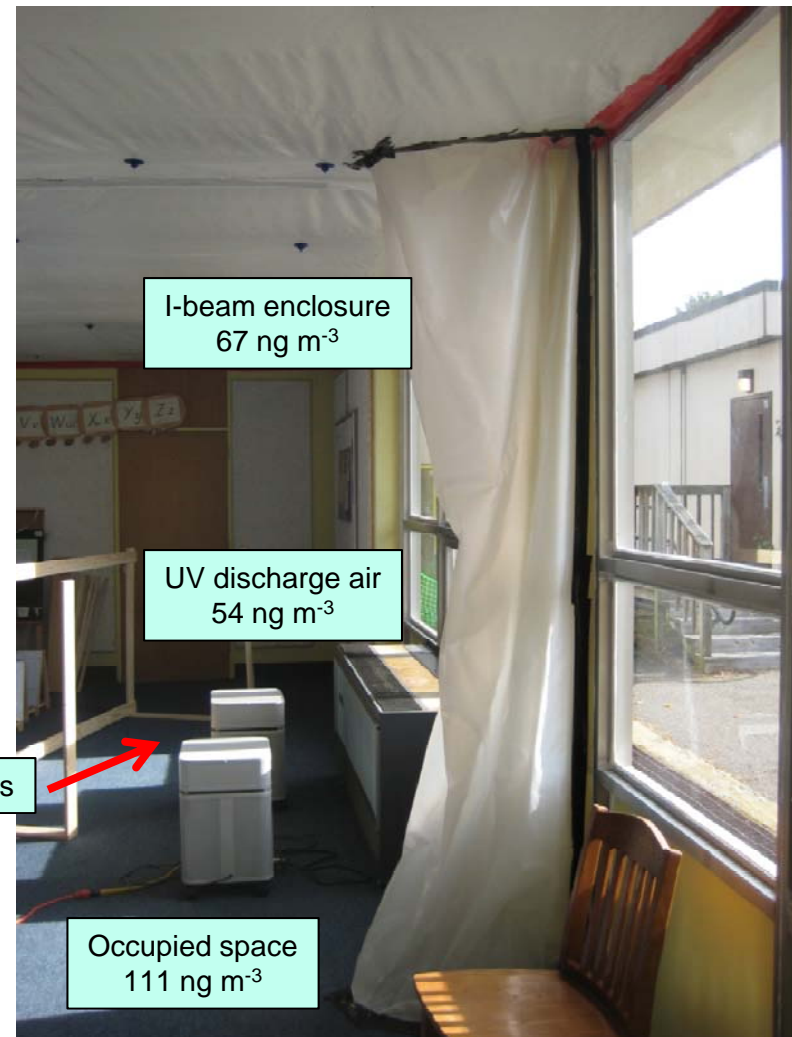
Room 1



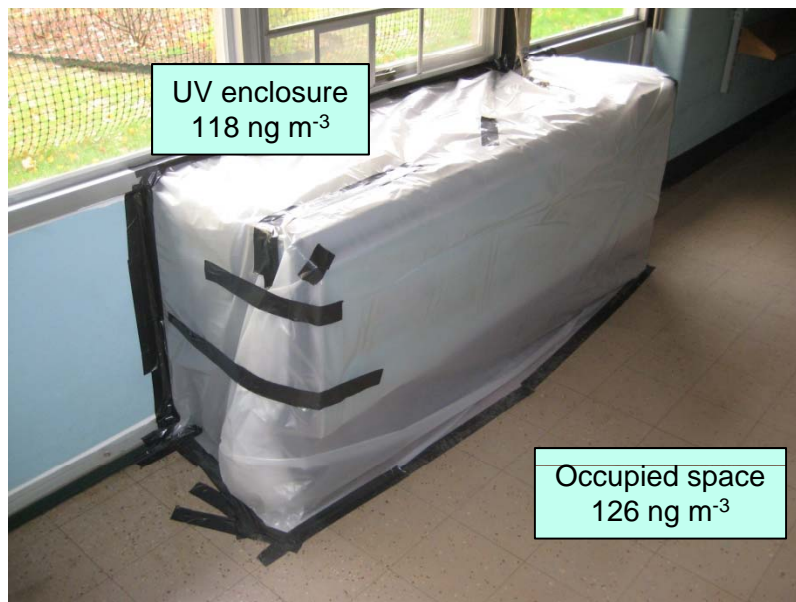
Room 2



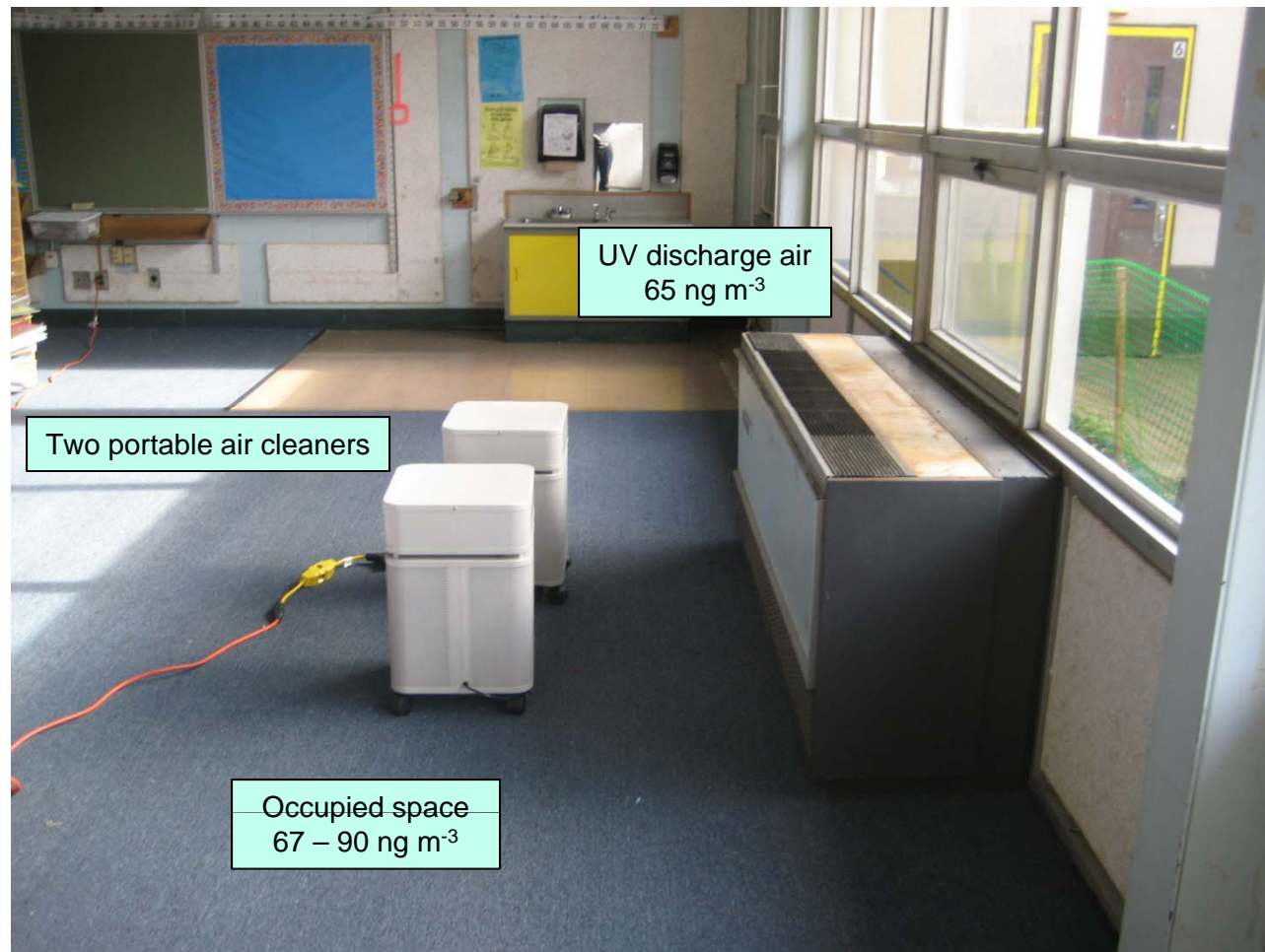
Room 3



Room 4



Room 5



Room 6



Source Characterization

Summary of Findings

- PCB levels in enclosures containing the curtain wall were higher than in the classroom
- PCB levels were highest in the enclosure that contained an operating steam radiator
- PCB levels in unit ventilators and in unit ventilator discharge air were approximately equal to or less than levels in air of the classrooms
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Source Characterization

Inferences

- Options for managing PCBs in indoor air further include:
 - Sealing components of the curtain wall
 - Minimizing heating of caulk on the interior of the curtain wall
 - Operating portable air cleaners with activated charcoal filters
- Ventilation provided by minimum damper position (~300 FM) is consistent with targets for PCBs in indoor air from EPA and site-specific assessments



Room 6 Mini-Wall



Mini-Wall Construction

- Exterior wall panels are sealed with foil coated foam board insulation.



Mini-Wall Construction



- Foam board is sealed to the frame with caulking.

Mini-Wall Construction



- Foam board is then covered with wall board, sealed, and painted to match classroom wall.

Mini-Wall Construction

- New Cove Base is added to finish the mini-wall construction.



Future Air Sampling Plan

- Assess effectiveness of mini-walls
 - November 3, 2010
 - Room 4 and 6
- School-wide assessment
 - November 8– 30, 2010
 - Sampling in all classrooms and specialty rooms
 - Following completion of mini-wall construction
- Explore options for more cost-effective analyses
 - Aroclor versus homolog
 - Further negotiated pricing with labs



Boiler Operation

- Working to balance outdoor air ventilation rate with heating capacity of the school
- Need to ensure PCB levels are maintained at an acceptable concentration
- YY – fill in preliminary calculations

Operations and Maintenance Plan Initial Outline

- Thru April 30, 2011
 - Mini-walls in each exterior room
 - Seal I-beam cavities
 - Notification and containment plan for ceiling tiles
 - Routine checks of mechanical system operation
 - Develop work plan for summer
 - Confirmation sampling of encapsulated window glazing
 - Confirmatory indoor air sampling
- FY 2012
 - Soil characterization
 - In development



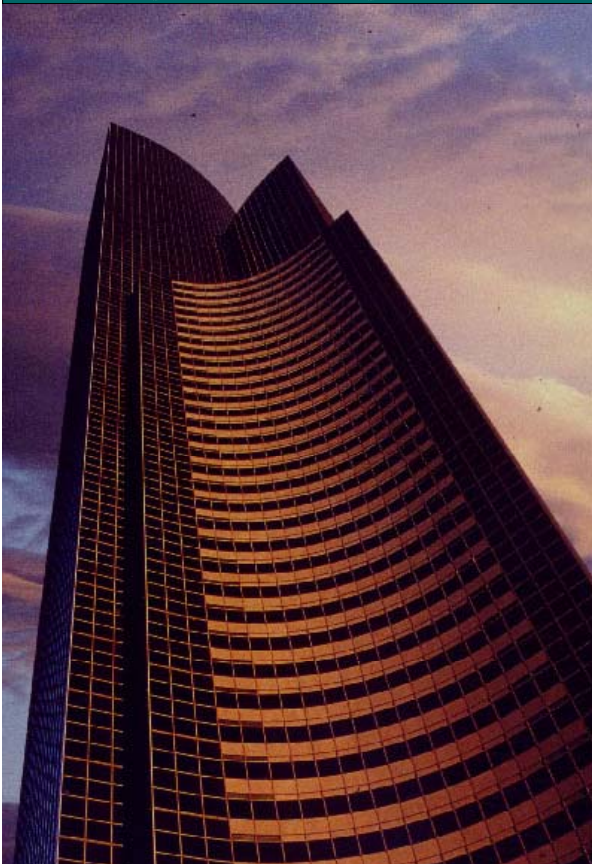
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Hypothesis Testing

Trial	Hypothesis	Room	Conditions	Sampling Parameters
A: Evaluate flux of polychlorinated biphenyls (PCBs) from window wall assembly in a heated and unheated zone	H1: Release of PCBs from curtain walls	2	<ul style="list-style-type: none"> Isolate west-facing wall, leaving unit ventilator exposed Isolate south-facing window wall and fin tube radiator Operate unit ventilator (UV) at same outdoor air flow as Round 6 Room Thermostat at 70 degrees Fahrenheit (°F), Boiler on. Door Closed. 	<ul style="list-style-type: none"> Evaluate air exchange within each isolated space using tracer gas. Log temperature in each enclosed space. Air samples in the occupied space, at the UV discharge air stream, and within the wall enclosures.
B: Evaluate practical way to control remaining emissions of PCBs from window wall		6	<ul style="list-style-type: none"> Foam insulation within frame, within 1 foot of convective heaters. Seal vertical frame member joints from floor to ceiling Seal I-beam chases. Seal cove base, top and bottom edges. Encapsulate caulk at junction of vertical and horizontal frames. Fill void behind convective heaters with insulation. Measure outdoor air flow rate. Room Thermostat at 70 °F, boiler on. Door Closed. 	<ul style="list-style-type: none"> Log temperature in room. Air samples in the occupied space.
C: Evaluate UV with a new motor, transformer and capacitor	H2: Release of PCBs from UV	1	<ul style="list-style-type: none"> UV isolated from room, steam pressure, and outdoor air. Isolate I-beam. Provide supplemental ventilation of 300 cubic feet per minute (cfm). Space heaters to warm the room to 70 °F. Door Closed. 	<ul style="list-style-type: none"> Log temperature in room and UV. Air samples in the occupied space, within the UV enclosure, and within the I-beam enclosure.
D: Evaluate UV with an old motor, transformer and capacitor		4	<ul style="list-style-type: none"> UV isolated from room, steam pressure, and outdoor air. Provide supplemental ventilation of 300 cfm. Door Closed. 	<ul style="list-style-type: none"> Log temperature in room. Air samples in the occupied space, and within the UV enclosure.
E: Assess effect of portable air cleaners with activated charcoal filters	H3: In-room filtration units can decrease PCBs	5	<ul style="list-style-type: none"> Two portable air cleaners, each operating at high fan speed (400 cfm) and located adjacent to UV. Operate UV at same outdoor air flow as Round 6. Room Thermostat at 70 °F, boiler on. Door closed. 	<ul style="list-style-type: none"> Log temperature in room. Air samples in the occupied space, and at the UV discharge air stream.
F: Assess combined effect of air cleaner and curtain wall encapsulation		3	<ul style="list-style-type: none"> Isolate I-beam. Seal cove base, top and bottom edges. Encapsulate caulk at junction of vertical and horizontal frames. Two portable air cleaners, each operating at high fan speed (400 cfm) and located adjacent to UV. Operate UV at same outdoor air flow as Round 6. Room Thermostat at 70 °F, boiler on. Door closed. 	<ul style="list-style-type: none"> Log temperature in room. Air samples in the occupied space, at the UV discharge air stream, and within the I-beam enclosure.